UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,959	12/11/2003	Abdo Esmail Abdo	ROC920020192US1	8764

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EXAMINER
LE, MICHAEL

ART UNIT	PAPER NUMBER
2163	

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

		Application No.	Applicant(s)
		10/733,959	ABDO ET AL.
Office Action Summary		Examiner	Art Unit	
		Michael Le	2163	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>18 August 2006</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-9 and 12-14</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>4 and 8</u> is/are allowed.

6)☒ Claim(s) <u>1-3,5-7,9 and 12-14</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
      Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
      Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Summary and Status of Claims

1.   This Office Action is in response to Applicant's reply filed August 18, 2006.

2.   Claims 10, 11, 15 and 16 are cancelled.

3.   Claims 1-9 and 12-14 are pending.

4.   Claims 4 and 8 are allowed.

5.   Claims 2, 3, 6, 7, 12 and 13 are rejected under 35 U.S.C. 112, second paragraph

6.   Claims 9 and 12-14 are rejected under 35 U.S.C. 101.

7.   Claims 1, 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable Burger (US

Patent Pub 2004/0059743) of record, in view of Applicant's Admitted Prior Art (AAPA).

8.   The text of those sections of Title 35, U.S. Code not included in this action can be found

in a prior Office action.

Claim Rejections - 35 USC § 112

9.   **Claims 2, 3, 6, 7, 12 and 13 are rejected under 35 U.S.C. 112, second paragraph**, as

being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

10.   **Claims 2, 6 and 12** recite "subtracting the frequency of all values above the

predetermined threshold in the frequent values list that satisfy the query from the total number of

rows in the database table." (Claim 2, lines 9-11; claim 6, lines 8-10; claim 12, lines 9-11).

Claims 3, 7 and 13 recite:

$$Y = X - Fi;$$

X = number of rows in the intermediate dataset; and

Fi = sum of frequencies of values in the frequent values list above the predetermined

threshold that satisfy the query.

(Claim 3, lines 11-14; claim 7, lines 12-15; claim 13, lines 11-14). The limitation recited in

claims 2, 6 and 12 seems to describe the expression "Y = X – Fi" recited in claims 3, 7 and 13.

The difference, however, is that the limitation recited in claims 2, 6 and 12 subtracts from the

"total number of rows in the database table" whereas the expression recited in claims 3, 7 and 13

subtracts from the "number of rows in the intermediate dataset." Referring back to parent claims

1, 5 and 9, an intermediate dataset is claimed as the rows of a database table that satisfy a query

(Claim 1, lines 6-7; claim 5, lines 2-3; claim 9, lines 2-3). There is an inconsistency in that

claims 1, 5 and 9 recite estimating cardinality of an intermediate dataset; claims 2, 6 and 12 then

recite that the cardinality estimator estimates the cardinality of the intermediate dataset using a

formula that utilizes the total number of rows in the database table (describing the subtraction

expression of the formula), however when further defining the formula in claims 3, 7 and 13, the

subtraction expression of the formula uses only the number of rows in the intermediate dataset.

It is unclear whether Applicant is attempting to claim that the formula utilizes only the number of

rows in the intermediate dataset or the total number of rows in the database table.

This inconsistency may be relieved in the rare situation that all the rows in the table

satisfy the query. In this situation, the intermediate dataset contains all the rows of the table.

However, this situation is rare in normal practice and in the vast majority of the queries, less than

all of the rows of the table satisfy the query. This is also signified by the term "intermediate

dataset" and its known meaning in the art.

Claim Rejections - 35 USC § 101

11.   **Claims 9 and 12-14 are rejected under 35 U.S.C. 101** because the claimed invention is

directed to non-statutory subject matter.

12.   The basis of this rejection is set forth in a test of whether the invention is categorized as a

process, machine, manufacture or composition of matter and if the invention produces a useful,

concrete and tangible result.   Mere ideas in the abstract (i.e., abstract idea, law of nature, natural

phenomena) are found to be non-statutory subject matter.   For a method claim to pass muster, the

recited process must produce a useful, concrete and tangible result.

13.   In the present case, **claims 9 and 12-14** recite a recordable media, which is defined in the

Specification as a "transmission type media such as digital and analog communication links" on

page 11, line 24.   The language of the limitation does not restrict the recordable media from

being a signal, thus the claims remain nonstatutory because the claimed subject matter can not be

categorized under one of the statutory categories of invention.   The Examiner suggests amending

the claim by changing "recordable media" to --computer storage media--.

14.   To expedite a complete examination of the instant application, the claims rejected under

35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of

applicant amending these claims to place them within the four statutory categories of invention

Claim Rejections - 35 USC § 103

15.   **Claims 1, 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burger (US Patent Pub 2004/0059743) of record, in view of Applicant's Admitted Prior Art (AAPA).**

16.   In regards to **claim 1**, Burger discloses an apparatus comprising:

   a.   at least one processor (Burger: para. 0015, lines 1-4);

   b.   a memory coupled to the at least one processor (Burger: para. 0015, lines 4-8);

   c.   a database table residing in the memory (Burger: para. 0015, lines 8-10);

   d.   an access module processor that collects statistical information on a sample size (intermediate dataset), such as data value frequencies, to determine data skew for feeding into a query optimizer (Burger: para. 0019; para. 0030; para. 0031, lines 1-5); and

   e.   a query optimizer residing in the memory that uses the estimated cardinality from the cardinality estimator to optimize the query (Burger: para. 0017, lines 6-7).

17.   Burger does not expressly disclose a cardinality estimator residing in the memory and executed by the at least one processor, the cardinality estimator estimating cardinality of an intermediate dataset that satisfies a query to the database table in a manner that accounts for data skew in the database table.

18.   AAPA discloses a prior art method and probabilistic formula for estimating cardinality of an intermediate dataset (AAPA: fig. 6; fig. 8).

19.   Burger and AAPA are analogous art because they are directed to the same field of endeavor of query optimization.

20.   At the time of the invention, it would have been obvious to one of ordinary skill in the art

to modify the apparatus of Burger by adding a cardinality estimator residing in the memory and

executed by the at least one processor, the cardinality estimator estimating cardinality of an

intermediate dataset that satisfies a query to the database table, as taught by AAPA, modified by

the teachings of Burger in a manner that accounts for data skew in the database table.

21.   The motivation for doing so would have been because data skew in statistic collection of

database tables is not unusual. For query optimization to be effective, the statistical information

given to the query optimizer must be accurate (Burger: para. 0017, lines 10-12; para. 0023).

Thus, given the exiting prior art probabilistic formula for estimating cardinality, one of ordinary

skill in the art would be apprised to modify it to account for data skew.

22.   **Claim 5** is substantially similar to claim 1 in the form of a method and is rejected for the

same reasons.

23.   **Claim 9** is substantially similar to claim 1 in the form of a program product and is

rejected for the same reasons. Addressing the additional limitation, Burger discloses a computer-

readable signal bearing media bearing the cardinality estimator (Burger: para. 0039).

Response to Amendment

Specification

24.   Applicant's amendment to the to correct typographical errors is acknowledged.

Applicant states in the Remarks that the Examiner's noted trademarks have been acknowledged,

however they remain unchanged because they are not typically capitalized in their use as

trademarks. Although Applicant's contention may be true, trademarks in the Specification must

still be identified. If capitalization is not proper, then use of the proper symbols for denoting

trademarks may be used (i.e. "TM"). See MPEP 608.01(v). Consequently, objection to the

specification is maintained.

Rejection of Claims 2-4, 8 and 12-16 under 35 U.S.C 112, Second Paragraph

25.   Claims 15 and 16 are cancelled rendering the rejection to them moot.

26.   Applicant's amendment to claims 2-4, 8 and 12-14 is acknowledged. Consequently, the

rejection to claims 4, 8 and 14 under 35 U.S.C. 112, second paragraph is withdrawn.

27.   Applicant's amendments to claims 2, 6 and 12 create new problems under 35 U.S.C. 112,

second paragraph as set forth in the rejection above. Consequently, the rejection of claims 2, 6

and 12 under 35 U.S.C. 112, second paragraph is maintained.

Rejection of Claims 1-16 under 35 U.S.C 101

28.   Claims 10, 11, 15 and 16 are cancelled rendering the rejection to them moot.

29.   Applicant's amendment to claims 1-9 and 12-14 is acknowledged. Consequently, the

rejection to claims 1-8 under 35 U.S.C. 101 is withdrawn.

30.   Regarding claims 9 and 12-14, the claims still recite a recordable media, which is still

defined as a signal. See the rejection of claims 9 and 12-14 under 35 U.S.C. 101 above.

Consequently, the rejection to claims 9 and 12-14 under 35 U.S.C. 101 is maintained.

Response to Arguments

Rejection of claims 1-16 under 35 U.S.C. 103(a)

31.   Claims 10, 11, 15 and 16 are cancelled rendering the rejection to them moot.

32.   Claims 4 and 8 are allowed for the reasons set forth below in the indication of allowable

subject matter, therefore the rejection to them is withdrawn.

33.   Claims 2, 3, 6, 7, 12 and 13 contain allowable subject matter. Consequently, the rejection

to claims 2, 3, 6, 7, 12 and 13 is withdrawn and they are now objected to because they each

depend on a rejected claim. Claims 2, 3, 6, 7, 12 and 13

34.   In regards to the rejection of claims 1, 5 and 9 under 35 U.S.C. 103(a), Applicant's

arguments have been fully considered but they are not persuasive.

35.   In regards to **claim 1**, Applicant alleges that there is no motivation to use Burger (US

Patent Pub 2004/0059743) to modify Applicant's Admitted Prior Art (AAPA) formula shown in

figure 6 to account for data skew (Page 17 of the Remarks). The Examiner respectfully

disagrees.

36.   Applicant's rationale to support lack of motivation to combine seems to stem from

Burger's teaching of adjusting the sample size of a data set when data skew is detected.

Applicant contends "the size of the sample in Burger has no bearing on the computation of

cardinality in AAPA" (Page 16 of the Remarks). On the contrary, the size of the sample very

much influences the computation of cardinality in AAPA. The AAPA formula uses the variable

X, which is defined as the umber of rows in the intermediate dataset. In Burger, the sample is

interpreted as the intermediate dataset and the size is the number of rows in the sample. In

paragraph 0021 of Burger, the purpose of a variable N in determining the sample size is

discussed. The discussion goes on to state that "[f]or example, if N equals 1, then the *percentage of rows* of a table read is 50%." (Para. 0021, lines 9-10; emphasis added). Thus, the sample size in Burger is clearly the number of rows in the sample dataset. For query optimization to be effective, the statistical information given to the query optimizer must be accurate (Burger: para. 0017, lines 10-12; para. 0023). Burger discloses adjusting the sample size to increase the accuracy of the statistical information (Burger: para. 0023, lines 8-10). Cardinality of a table is a common statistic in the art. Since the size of the intermediate dataset influences computation of cardinality as explained above and Burger teaches changing the sample size to increase accuracy of statistical information, one of ordinary skill in the art would have been motivated use Burger to modify AAPA to account for data skew.

37.   Applicant further argues that the combination of Burger and AAPA does not result in the unique combination of features as recited in claim 1 (Page 17 of the Remarks). Applicant fails to particularly point out why the combination is unique over the combination of Burger and AAPA. Instead, Applicant merely argues that Burger and AAPA are directed toward different concepts. On the contrary, Burger and AAPA are both directed toward query optimization, as noted by Applicant, and also to the computation of statistics, such as cardinality, to determine optimizations to a query (Burger: para. 0019; AAPA, page 17 of the Remarks).

38.   Applicant further argues that the Examiner's combination was based on hindsight reasoning. As explained above, the motivation to combine was clearly not based on hindsight reasoning.

39.   The arguments for claims 5 and 9 are addressed under the same rationale.

40.   Consequently, the rejection to claims 1, 5 and 9 under 35 U.S.C. 103(a) is maintained.

Allowable Subject Matter

41.   Claims 2, 3, 6, 7, 12 and 13 would be allowable if rewritten to overcome the rejections

under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the

limitations of the base claim and any intervening claims. In addition, claim 13 would only be

allowable if it is also rewritten to overcome the rejection under 35 U.S.C. 101, set forth in this

Office action.

42.   Claim 14 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 101

set forth in this Office Action.

43.   The following is a statement of reasons for the indication of allowable subject matter:

44.   Applicant's arguments with regard to claims 2, 6 and 12 (Page 19-21 of the Remarks) are

only partially persuasive. Applicant's argument that neither Burger nor AAPA disclose the

subtracting function expressly recited in claim 2. However, Applicant's arguments alleging that

Burger teaches away from the limitation "the total number of rows in the database table" is not

persuasive. In view of the explanation of the rejection of claims 2, 3, 6, 7, 12 and 13 above, the

same size in Burger could be the total number of rows in the database table. In fact, Burger

expressly discloses that "[u]nder certain conditions, the sample size can be greater than 50%."

(Burger: para. 0030, lines 15-16). Also, Burger performing calculations to estimate frequencies

for the entire database table (Burger: para. 0033). Thus, Burger does not teach away from using

the "total number of rows in the database table", but clearly suggests it. Additionally,

Applicant's argument that the motivation to combine is flawed because "[m]odifying sample size

has no relation whatsoever to the calculation of a cardinality estimate" (Page 20 of the Remarks)

was addressed above with respect to the arguments set forth in regards to claim 1. However, despite the two latter arguments being unpersuasive, the closest prior art, Burger and AAPA, do not disclose or suggest the subtracting function recited in claims 2, 6 and 12. Thus, the arguments are partially persuasive and the allowable subject matter is the aforementioned subtracting function.

45.   Claims 3, 7, 13 and 14 recite the use of a formula for estimating cardinality of an intermediate dataset when data skew is present. The closest prior art is Applicant's admitted prior art (AAPA) shown in Figures 6 and 8 of the instant invention. The difference between the AAPA and the formula recited in the claims is that the formula recited in the claims accounts for data skew while the prior art formula assumes a uniform distribution. In the prior Office Action, claims 2, 3, 6, 7 and 12-14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Burger (US Patent Pub 2004/0059743) in view of AAPA. Burger discloses a method of query optimization, which utilizes gathered statistics of a data set to detect data skew and using the gathered statistics to generate an optimized query plan (Burger: para. 0019, 0023). Although directed toward solving the same problem, Burger does not expressly disclose the formula recited in the claims.

46.   Applicant's arguments with regard to claims 3, 7, 13 and 14 (Page 21 of the Remarks), after being fully considered, are persuasive. Although Burger and AAPA could be combined since together they disclose the limitations of the claims, there exists no motivation within the references or in the general knowledge of one of ordinary skill in the art to combine the two references to produce the specific formula recited in the claims. Therefore, a *prima facie* case of obvious cannot be established.

47.   Lohman et al. (US Patent Pub 2002/0198867) hereinafter "Lohman", is also close prior art. Lohman discloses a method of query optimization where statistics, such as cardinality, are gathered to determine data skew. The information is then used to aid the query optimizer in selection a more optimized query plan (Lohman: para. 0018, lines 6-14; para. 0028, lines 4-7; para. 0049, lines 4-13; para. 0050, lines 1-5). Lohman, however, does not disclose or suggest the subtracting function or the specific formula recited in the claims.

48.   **Claims 4 and 8** are allowed.

49.   The following is an examiner's statement of reasons for allowance: Claims 4 and 8 are independent claims, which include the allowable subject matter as described above with respect to claims 3, 7, 13 and 14.

50.   Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

51.   Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
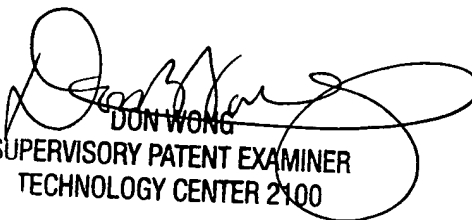
52.   A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

53.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Michael Le whose telephone number is 571-272-7970. The

examiner can normally be reached on Mon-Thurs : 9:30am-6pm, Fri: 8am-4:30pm.

54.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

55.   Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DON WONG
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Michael Le
Art Unit 2163

Art Unit: 2163

October 28, 2006